AN 08-30ARW9-2

HANDBOOK OF OPERATING INSTRUCTIONS

for

RADIO SET AN/ARW-9

RESTRICTED

(For Official Use Only)

Approved 11 December 1944

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SAFETY NOTICE

This equipment employs high voltages and contains explosives for destruction purposes. These are dangerous to life and may be fatal to operating personnel if proper caution is not exercised when working with the equipment.

DESTRUCTION OF ABANDONED MATERIEL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving, or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

★

UNSATISFACTORY REPORT

For U. S. Army Air Force Personnel:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the materiel contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Radio model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

For U. S. Navy Personnel:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

For British Personnel:

Form 1022 procedure shall be used when reporting failure of radio equipment.

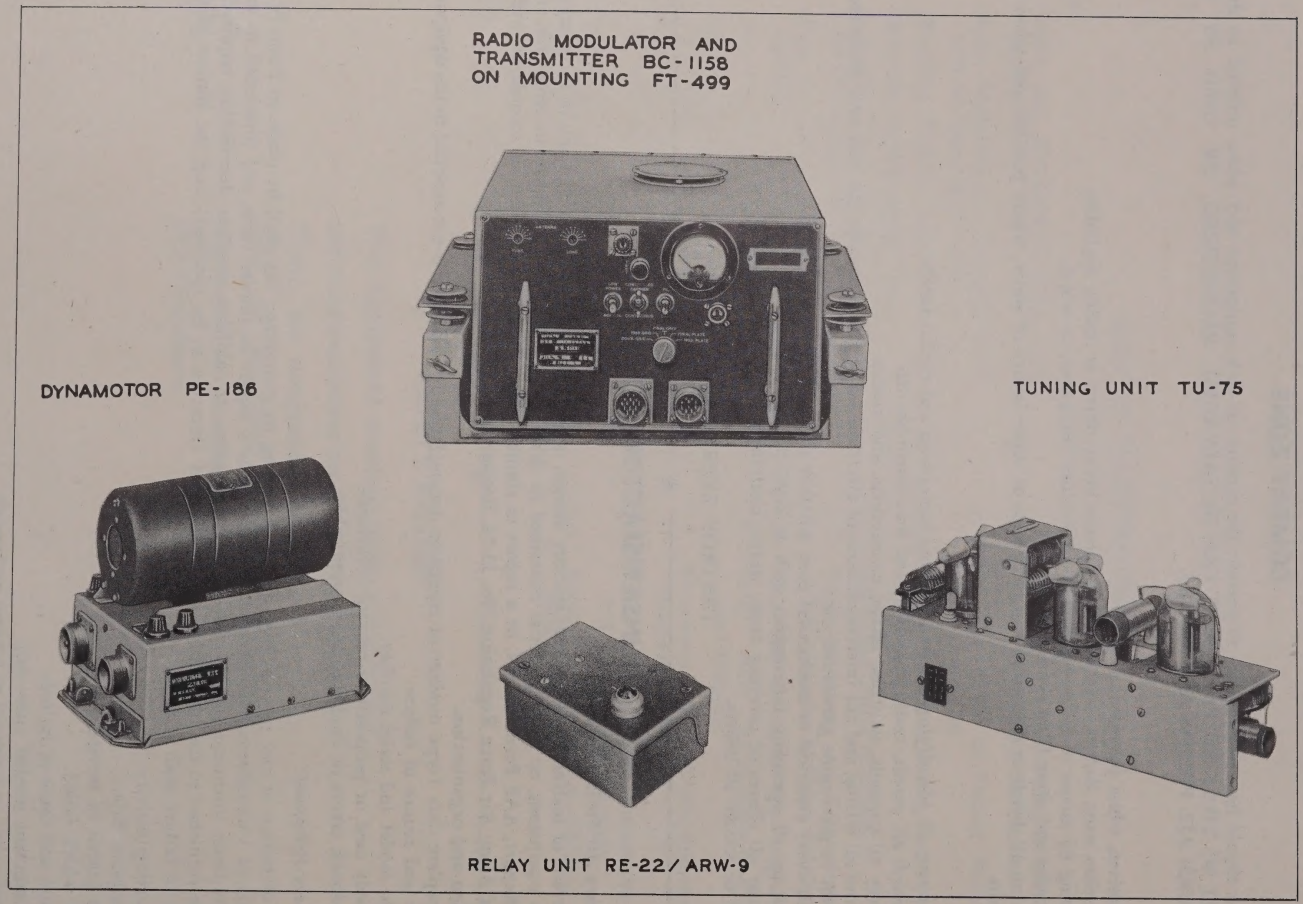


Figure 1–1. Radio Set AN/ARW-9—Major Components

SECTION I
GENERAL DESCRIPTION

1. GENERAL.

a. Radio Set AN/ARW-9 (see fig. 1–1) comprises the transmitting end of a remote control radio system and is primarily designed for operation from an aircraft.

b. Tuning Unit TU-75 is usually supplied with Radio Set AN/ARW-9, but Tuning Unit TU-70 is sometimes supplied with the equipment. These tuning units have a frequency color code which is found on top of the crystal socket.

(1) Any one of 25 crystals may be supplied with Tuning Unit TU-75. The exact frequency of the particular crystal used is shown by color coding in two places:

(a) On the top of the crystal itself.

(b) On the card in the holder on the front panel of Radio Modulator and Transmitter BC-1158. (See fig. 1–2.)

(2) The color code used in positions *(a)* and *(b)* this section, is explained in Sec. V, par. 1 of this book.

c. When the transmitter is tuned and loaded, Radio Set AN/ARW-9 draws approximately 13 amperes from a source of 24 to 28 volts direct current.

2. EQUIPMENT SUPPLIED.

The following equipment is supplied with Radio Set AN/ARW-9:

Figure 1–2. Radio Modulator and Transmitter BC-1158 on Mounting FT-499

Quantity	*Name of Unit*	*Army Type Designation*	*Navy Type Designation*	*Dimensions (inches)*	*Weight (lbs.)*
*1	Radio Modulator and Transmitter, including:	BC-1158 or BC-1158-A		8⅛ x 16⅝ x 16⅝	32.0
1	Tube Set				
1	Mounting	FT-499		4 x 13 11/16 x 15 15/16	0.5
2	Plug	AN-3106-20-1S	AN-3106-20-1S		0.16 each
2	Adapter	AN-3057-12	AN-3057-12		.06 each
2	Plug	AN-3106-18-1S	AN-3106-18-1S	See Sec. II par. 1 h (2)	0.13 each
2	Adapter	AN-3507-10	AN-3507-10		0.05 each
1	Plug	AN-3106-12-3S	AN-3106-12-3S		0.04
1	Adapter	AN-3057-4	AN-3057-4		0.02
1	Plug	PL-259		1½ x ¾ dia.	0.05
1	Adapter	M-359			
‡1	Tuning Unit, including	TU-75			
1	Tube Set				
25	Crystal Unit	CR-1A/AR			
1	Case	CS-151			
1	Set Frequency Range Indicating Cards				
*1	Dynamotor Unit	PE-186 or PE-186-A		7⅛ x 8⅛ x 9½	18.3
*1	Dynamotor Unit	PE-186 or PE-186-A		7⅛ x 8⅛ x 9½	18.3
1	Mounting	FT-497			
1	Plug	AN-3106-22-1S	AN-3106-22-1S		
2	Adapter	AN-3057-12	AN-3057-12	See Sec. II par. 1 h (2)	
1	Plug	AN-3106-20-1S	AN-3106-20-1S		
1	Indicator Box	BC-767 or BC-727			0.34
2	Lamp	LM-49			
1	Relay Unit	RE-22/ARW-9		4⅜ x 2⅞ x 2	1.0
1	Plug	AN-3106-14S-2S	AN-3106-14S-2S		
1	Plug	AN-3106-14S-1S	AN-3106-14S-1S	See Sec. II par. 1 h (2)	
2	Adapter	AN-3057-6	AN-3057-6		
†1	Antenna System	AS-97/ART			
1	Antenna Assembly	AS-150/ART			
†1	Antenna Assembly	AS-161/ART			
1	Antenna Base	AB-29/ART			
As required	Cable	WC-549 or RG-8/U or RG-31/U			
1	Plug	PL-259			
1	Adapter	M-359			
1	Receptacle	AN-3100-8S-1P	AN-3100-8S-1P		
1	Plug	AN-3106-8S-1S	AN-3106-8S-1S		
2	Adapter	AN-3057-3	AN-3057-3		
1	Microswitch	G.E. CR1070C103-B3			

* Alternate components are externally interchangeable; however, replaceable parts are not interchangeable.

† In addition to Antenna Assembly AS-150/ART, one each Antenna System AS-97/ART and Antenna Assembly AS-161/ART are required when Tuning Unit TU-75 is provided with this equipment. Antennas not installed are to be packed separately for storage in the aircraft until destination is reached.

‡ Tuning Unit TU-70 or TU-70-A will be supplied if Tuning Unit TU-75 is not available.

SECTION II

INSTALLATION AND ADJUSTMENT

WARNING

Before attempting to operate Radio Set AN/ARW-9 the following instructions should be understood and the various procedures carried out. If the airplane is on the ground for any length of time, remove Plug AN-3106-12S-3S from the destructor unit. Improper handling of the destructor unit may result in bodily harm.

1. INSTALLATION.

a. PRELIMINARY.

(1) UNPACKING.—Use care in unpacking the equipment so that nothing is damaged. Then give the equipment a visual check to make sure that everything is in good order. Check against the list in Sec. I, par. 2 to make sure that all parts are there.

(2) BENCH TEST.—Before Radio Set AN/ARW-9 is installed in the aircraft the major assemblies should be checked for proper operation. The equipment should be set up on the bench in any convenient manner (see fig. 5–4). The interconnecting cords between the components need not be the same length as they will be when the equipment is installed in the aircraft. The procedure given in par. 2, this section should be followed to adjust and check the equipment before it is installed.

b. PROCEDURE.

(1) MOUNTING FT-499.—Bolt this mounting through the holes provided (see fig. 2–1) to a suitable horizontal surface. Clearance for shockmount action must be added to the overall dimensions given for the mounting and for the modulator and transmitter shown in figure 5–3. Allow sufficient air space around the cooling louvers and the vent in the top.

(2) RADIO MODULATOR AND TRANSMITTER BC-1158.—Slide the modulator and transmitter into place on Mounting FT-499. Fasten the modulator and transmitter by giving the two fasteners at the front a quarter-turn clockwise. (See fig. 1–2.)

(3) MOUNTING FT-497.—Bolt this mounting through the four holes provided to a suitable horizontal surface (see fig. 2–2). Overall dimensions are given for Mounting FT-497 and Dynamotor Unit PE-186 in figure 5–2.

(4) DYNAMOTOR UNIT PE-186.—Lower the dynamotor unit over the four studs on Mounting FT-497. Fasten the snapslide fasteners on the dynamotor unit (see fig. 2–4) over the studs on the mounting.

(5) RELAY UNIT RE-22/ARW-9. This unit should be mounted on the left wall of the fuselage in the compartment of the operator of this equipment. It should be located where the light is visible to the operator.

(6) ANTENNA INSTALLATION.—A typical antenna installation is shown in figure 2–5. Antenna Assembly AS-150/ART (see fig. 2–6) is used with Tuning Unit TU-70. When Tuning Unit TU-75 is used both Antenna System AS-97/ART and Antenna Assembly AS-161/ART are required in addition to Antenna Assembly AS-150/ART. Antennas not installed are to be packed separately for storage in the aircraft until destination is reached. Cable WC-549, RG-8/U or RG-31/U must be used to connect the antennas to the transmitter.

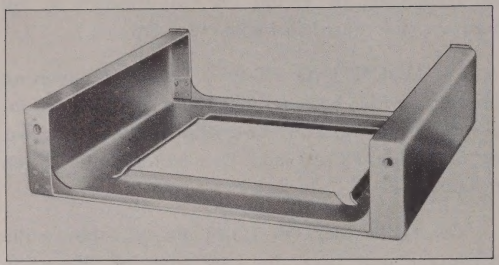


Figure 2–1. Mounting FT-499—Angle View

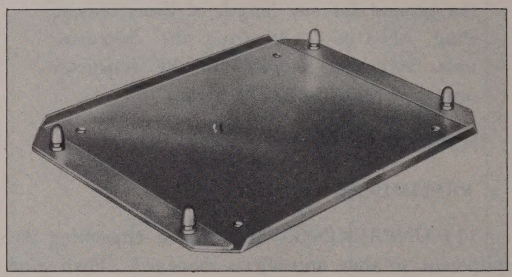


Figure 2–2. Mounting FT-497—Angle View

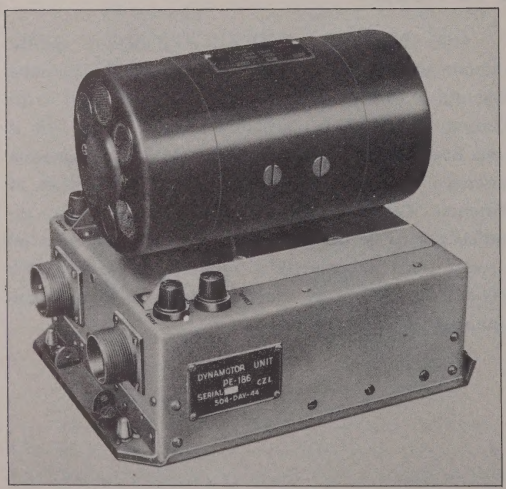


Figure 2–3. Dynamotor Unit PE-186 on Mounting FT-497—Angle View

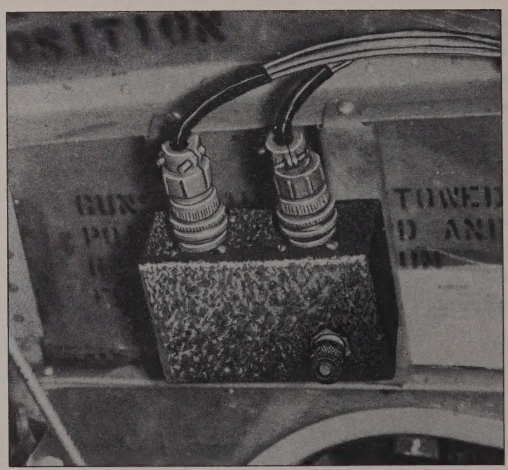


Figure 2–4. Relay Unit RE-22/ARW-9—Typical Installation

CAUTION

The use of any cable other than Cables WC-549, RG-8/U or RG-31/U will result in low power output and difficulty with transmitter loading.

(7) GROUNDING.—Ground securely Radio Modulator and Transmitter BC-1158 and the antenna

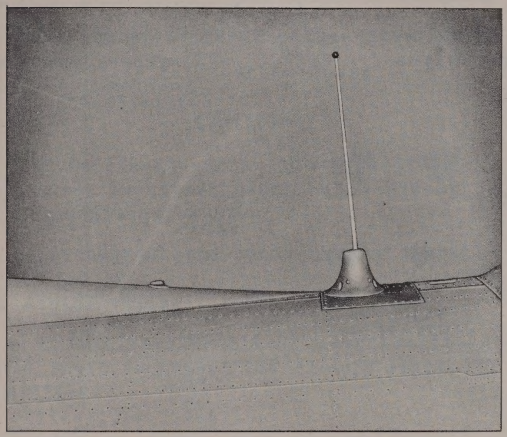


Figure 2–5. Typical Antenna Installation

when installing these components in an aircraft or vehicle having a common ground. Make sure that clean electrical contacts are made between Mounting FT-499 and the main structure of the aircraft.

c. CABLE CONNECTIONS.

(1) Instructions for making up the interconnecting cables (open wiring) which are attached by

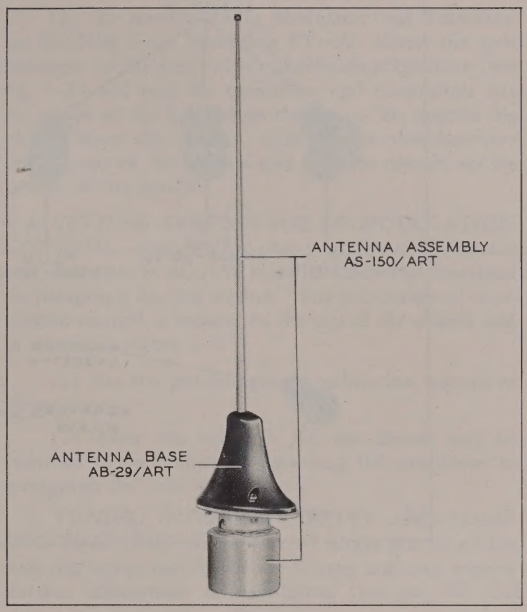
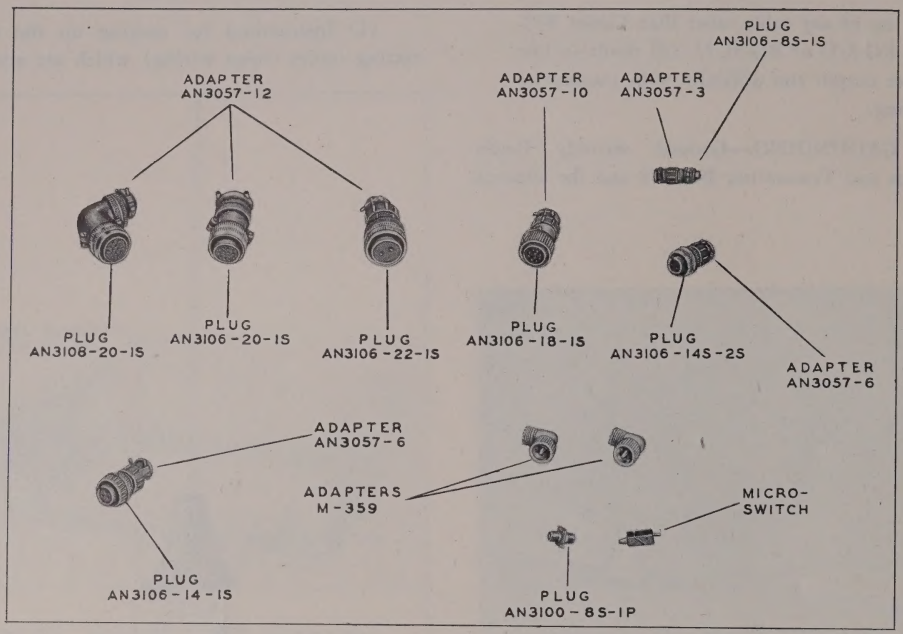


Figure 2–6. Antenna Assembly AS-150/ART on Antenna Base AB-29/ART

means of AN-type plugs and the method of connecting are shown in figure 5–4.

(2) The following table and figure 2–7 show the dimensions and weights of some plugs and adapters used in Radio Set AN/ARW-9.

Plugs and Adapters	*Maximum Dimensions*			*Weight (lbs.)*
	D	*L*	*N*	
AN-3106-12S-3S	1	$1\frac{11}{16}$		.04
AN-3106-14S-2S				
AN-3106-14S-1S				
AN-3106-18-1S	$1\frac{11}{32}$	$2\frac{1}{16}$		.13
AN-3106-20-1S	$1\frac{15}{32}$	$3\frac{3}{16}$		.16
AN-3106-8S-1S				
AN-3106-8S-1S				
AN-3106-22-1S	$1\frac{19}{32}$	$2\frac{3}{16}$		.18
AN-3057-3				
AN-3057-4	$\frac{5}{16}$	1		.02



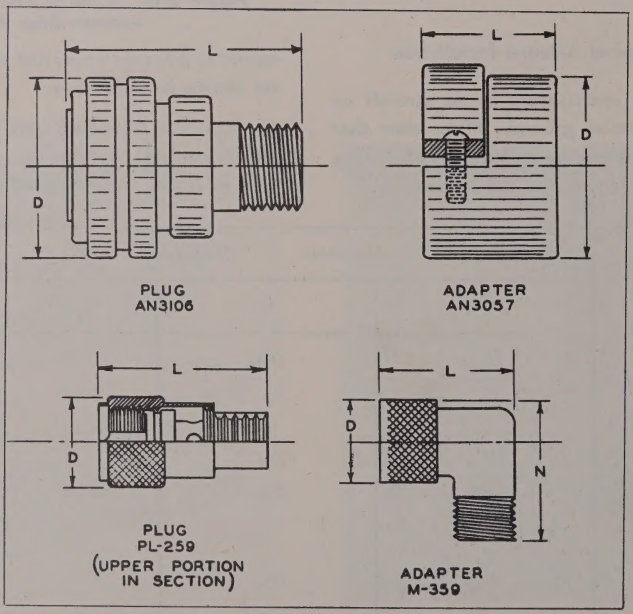


Figure 2–7. Plugs and Adapters Used With Radio Set AN/ARW-9

Plugs and Adapters	Maximum Dimensions			Weight (lbs.)
	D	L	N	
AN-3057-6				
AN-3057-10	1 7/16	1 1/8		.05
AN-3057-12	1 9/16	1 3/16		.06
PL-259	3/4	1 1/2		.05
M-359	3/4	1 1/4	1 1/4	.076

(3) The polarity of the primary power connection must be observed.

CAUTION

If the primary power connections are reversed, the primary power supply will be short-circuited.

(4) Screw all plugs tightly into their receptacles.

2. ADJUSTMENT.

a. REMOVING CHASSIS OF RADIO MODULATOR AND TRANSMITTER BC-1158 FROM ITS CABINET.

(1) Make sure that the "FIL-OFF" switch is in the "OFF" position. Make sure the trigger arm on the associated equipment is unlocked. When this arm is in the unlocked position, no high voltage is supplied to the chassis of Radio Modulator and Transmitter BC-1158, and no power is supplied to the cooling fan. Thus there is no danger of shock or of injury from the rapidly rotating fan blades.

(2) To remove Radio Modulator and Transmitter BC-1158 from Mounting FT-499, loosen the two fasteners on the front of the shockmount brackets (see fig. 1–2) and pull the modulator and transmitter out by means of the handles on the front. To remove the chassis from the cabinet, unfasten the two fasteners on the rear of the cabinet and pull the chassis out by means of the handles.

b. SETTING PERCENTAGE OF MODULATION CONTROL.—Remove the chassis of Radio Modulator and Transmitter BC-1158 from its cabinet as described in paragraph 2*a*, this section. The percentage of modulation control is located on the top of the chassis and is shown in figure 2–8.

(1) Set the percentage of modulation control at 90 percent.

(2) After the switch is set, the chassis may be returned to its cabinet by reversing the procedure in paragraph 2*a*, this section.

c. TUNING ANTENNA CIRCUIT AND LOADING TRANSMITTER.—The r-f stages are tuned before the equipment leaves the factory but may require further adjustment at installation (see par. 2*d*, this section). It will be necessary to tune the antenna circuit and properly load the transmitter upon completing installation, as these adjustments will vary, depending upon the particular antenna used.

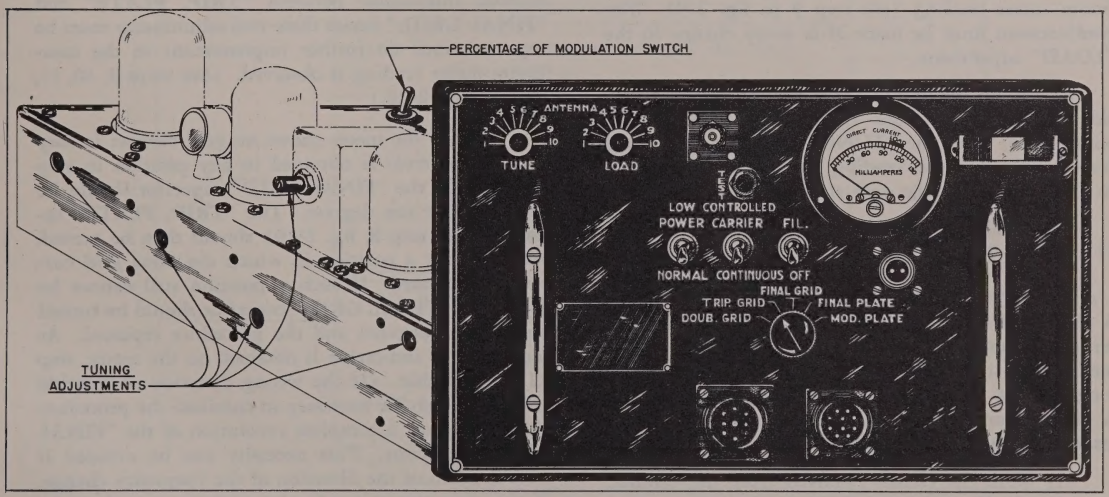


Figure 2–8. Radio Modulator and Transmitter BC-1158—Location of Controls and Adjustments

Proceed as follows:

(1) Ground the transmitter and connect the antenna as in actual operations (see steps 1 and 2 in fig. 2–9).

(2) Turn the "FIL-OFF" switch on the front panel of Radio Modulator and Transmitter BC-1158 to the "FIL" position (see step 3 in fig. 2–9).

(3) Make sure the "CONTROLLED CARRIER-CONTINUOUS" switch is in the "CONTINUOUS" position.

(4) After 30 seconds, push the "TEST" button and turn the arrow switch to "FINAL PLATE" (see steps 4 and 5 in fig. 2–9).

(5) Inserting a small screwdriver through the transmitter panel opening marked "TUNE," turn the screw adjustment until the milliammeter reads maximum on the meter scale (see step 6 in fig. 2–9).

(6) Check the maximum meter reading to find if it falls within the meter scale "LOAD" range, which indicates the optimum load (see step 7 in fig. 2–10).

(7) If the maximum meter reading falls outside the "LOAD" range, insert the screwdriver into the panel opening marked "LOAD" (see step 8 in fig. 2–9). Turn the adjustment until the meter reads within the "LOAD" range.

(8) Readjust the "TUNE" condenser for the maximum meter reading (see step 9 in fig. 2–9). The readjustment must be made after every change in the "LOAD" adjustment.

(9) If the maximum meter reading still falls outside the "LOAD" range, repeat steps (6) and (7) above until, when the "TUNE" condenser is adjusted for a maximum meter reading, this reading falls within the "LOAD" range (see step 10 in fig. 2–9).

(10) Release the "TEST" push button (see step 11 in fig. 2–9).

d. TUNING RADIO-FREQUENCY CIRCUITS.—A change of crystals, tuning units, tubes, or even internal characteristics will often occur after the equipment leaves the factory so that the panel meter no longer reads within the "LOAD" range. (See par. 2*c* this section.) In any of these cases it will be necessary to retune the r-f circuits in the service depot.

(1) With the chassis removed from the cabinet, open the linking switch which is situated between the antenna-tuning and antenna loading capacitors on the terminal board at the top of the back side of the panel. (See step 1, fig. 2–10).

(2) Turn the "FIL.-OFF" switch on the front of the transmitter to the "FIL." position if used and allow thirty seconds for the filaments to heat. (See step 2, fig. 2–10). Make sure the "CONTROLLED CARRIER-CONTINUOUS" switch is in the "CONTINUOUS" position.

(3) Push and hold the push-button switch (or hold the toggle switch, as the case might be) labeled "TEST" on the front panel of the transmitter. (See step 3, fig. 2–10.)

(4) Adjust toggle and slide switches to be in black position for low band, and in orange position for high band. (See step 4, fig. 2–10.)

(5) Turn the meter circuit-selector knob on the front panel to "DOUB. GRID." (See step 5, fig. 2–10.)

(6) Tune the "DOUB. GRID" condenser, by means of a screwdriver, through the hole in the chassis at the far rear of the transmitter (see step 6, fig. 2–10), until a maximum reading is indicated on the milliammeter.

(7) Turn the meter circuit-selector knob to "TRIP. GRID," insert the screwdriver through the second hole (marked "TRIP. GRID"), and adjust for the maximum milliammeter reading (see steps 7 and 8, fig. 2–10).

(8) Turn the meter switch to "FINAL GRID," insert the screwdriver in "TRIP. PLATE," and adjust for maximum reading of the milliammeter.

(a) If the meter shows grid current, insert the screwdriver in "FINAL GRID," and again adjust for maximum reading of the milliammeter. There is marked interaction between "TRIP. PLATE" and "FINAL GRID;" hence these two adjustments must be repeated until no further improvement in the maximum meter reading is observed. (See steps 9, 10, 11, and 12, fig. 2–10.)

(b) If the meter shows no grid current in step 9 and no current is obtained in any position in step 10, fig. 2–10 the "FINAL GRID" capacitor should be turned about ten degrees. The "TRIP. PLATE" capacitor (see step 8, fig. 2–10) should then be turned, searching for a position in which the same grid current is indicated. If such a position still cannot be found, the "FINAL GRID" capacitor should be turned another ten degrees, and the procedure repeated. As soon as some indication is obtained on the meter, step 12 is applicable. (If the wrong direction of rotation is made, it may be necessary to continue the procedure through almost a complete revolution of the "FINAL GRID" capacitor. This necessity can be avoided if note is taken of the direction of the frequency change. If the new crystal is of a lower frequency than the original crystal, the "FINAL GRID" capacitor should be turned in the direction of increasing capacity. If the new crystal is of a higher frequency, the capacitor should be turned in the direction of decreasing capacity.)

(9) Set the meter switch to "FINAL PLATE" and tune the "FINAL PLATE" capacitor to reso-

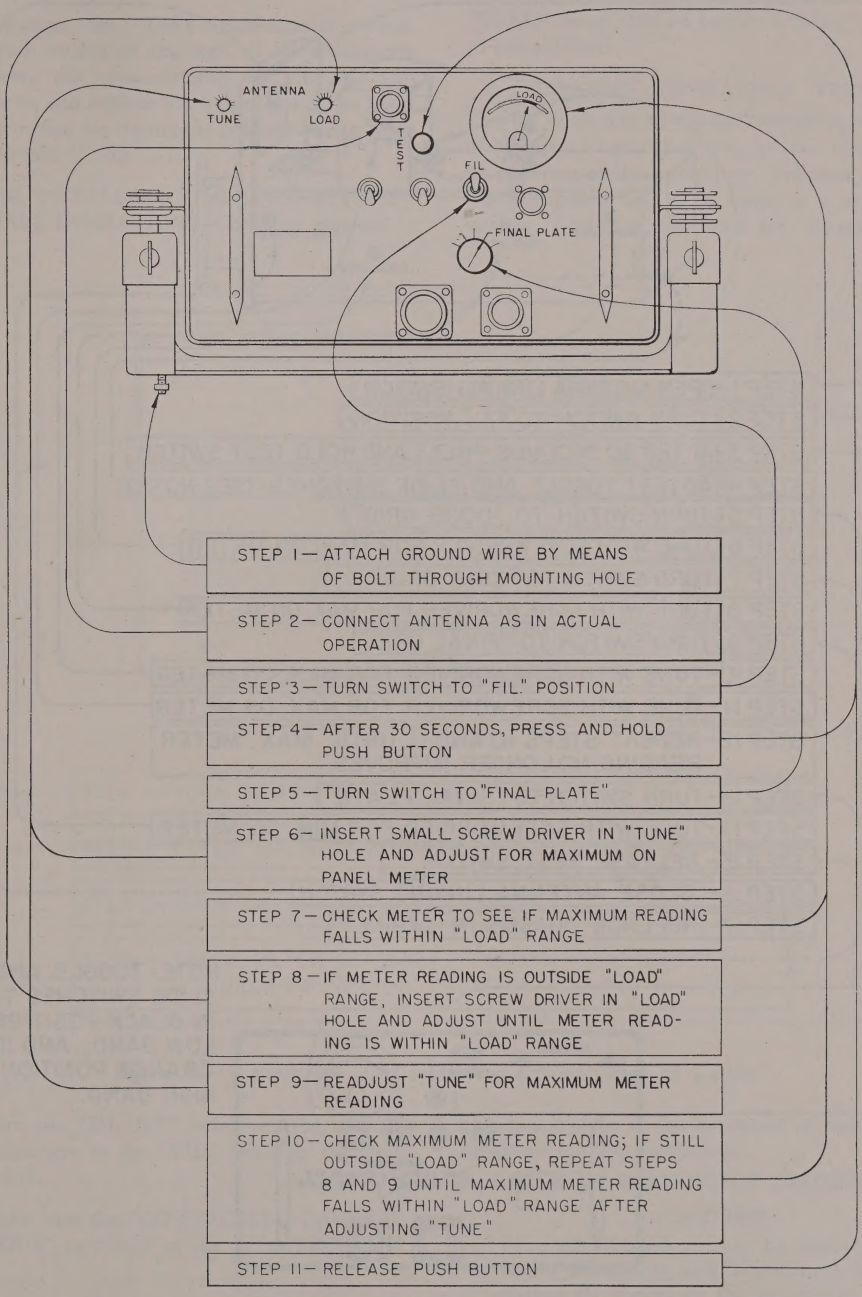

ANTENNA
TUNE
LOAD
TEST
LOAD
FIL
FINAL PLATE
STEP 1— ATTACH GROUND WIRE BY MEANS OF BOLT THROUGH MOUNTING HOLE
STEP 2— CONNECT ANTENNA AS IN ACTUAL OPERATION
STEP 3— TURN SWITCH TO "FIL." POSITION
STEP 4— AFTER 30 SECONDS, PRESS AND HOLD PUSH BUTTON
STEP 5— TURN SWITCH TO "FINAL PLATE"
STEP 6— INSERT SMALL SCREW DRIVER IN "TUNE" HOLE AND ADJUST FOR MAXIMUM ON PANEL METER
STEP 7— CHECK METER TO SEE IF MAXIMUM READING FALLS WITHIN "LOAD" RANGE
STEP 8— IF METER READING IS OUTSIDE "LOAD" RANGE, INSERT SCREW DRIVER IN "LOAD" HOLE AND ADJUST UNTIL METER READING IS WITHIN "LOAD" RANGE
STEP 9— READJUST "TUNE" FOR MAXIMUM METER READING
STEP 10— CHECK MAXIMUM METER READING; IF STILL OUTSIDE "LOAD" RANGE, REPEAT STEPS 8 AND 9 UNTIL MAXIMUM METER READING FALLS WITHIN "LOAD" RANGE AFTER ADJUSTING "TUNE"
STEP 11— RELEASE PUSH BUTTON

Figure 2–9. Procedure Used in Tuning Antenna Circuit and Loading Transmitter

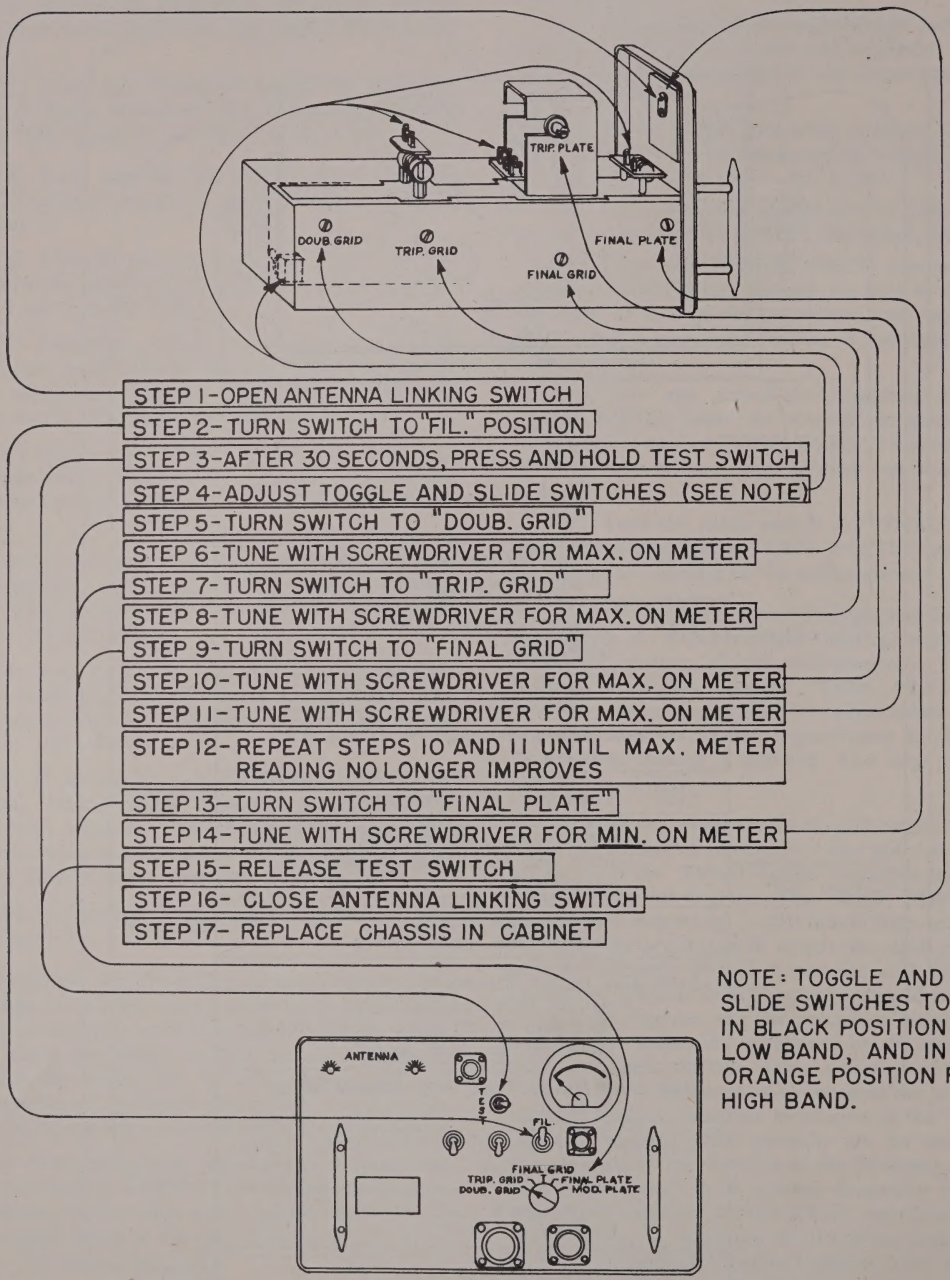

TRIP. PLATE
DOUB. GRID
TRIP. GRID
FINAL GRID
FINAL PLATE
STEP 1-OPEN ANTENNA LINKING SWITCH
STEP 2-TURN SWITCH TO "FIL." POSITION
STEP 3-AFTER 30 SECONDS, PRESS AND HOLD TEST SWITCH
STEP 4-ADJUST TOGGLE AND SLIDE SWITCHES (SEE NOTE)
STEP 5-TURN SWITCH TO "DOUB. GRID"
STEP 6-TUNE WITH SCREWDRIVER FOR MAX. ON METER
STEP 7-TURN SWITCH TO "TRIP. GRID"
STEP 8-TUNE WITH SCREWDRIVER FOR MAX. ON METER
STEP 9-TURN SWITCH TO "FINAL GRID"
STEP 10-TUNE WITH SCREWDRIVER FOR MAX. ON METER
STEP 11-TUNE WITH SCREWDRIVER FOR MAX. ON METER
STEP 12-REPEAT STEPS 10 AND 11 UNTIL MAX. METER READING NO LONGER IMPROVES
STEP 13-TURN SWITCH TO "FINAL PLATE"
STEP 14-TUNE WITH SCREWDRIVER FOR MIN. ON METER
STEP 15-RELEASE TEST SWITCH
STEP 16-CLOSE ANTENNA LINKING SWITCH
STEP 17-REPLACE CHASSIS IN CABINET
NOTE: TOGGLE AND SLIDE SWITCHES TO BE IN BLACK POSITION FOR LOW BAND, AND IN ORANGE POSITION FOR HIGH BAND.
ANTENNA
TEST
FIL.
FINAL GRID
TRIP. GRID
DOUB. GRID
FINAL PLATE
MOD. PLATE

Figure 2–10. Procedure Used in Tuning Radio-Frequency Circuits

nance, which is indicated by minimum plate-current reading (see steps 13 and 14, fig. 2–10).

(10) Release the "TEST" push-button switch, close the link switch on the back of the transmitter panel between the antenna-tuning and antenna-loading capacitors, and replace the transmitter in its housing in preparation for tuning the antenna circuit. (See steps 15, 16 and 17, fig. 2–10.)

e. AFTER INSTALLATION INSPECTION TEST OF OVERALL OPERATION.—Checking carrier.

(4) Observe the reading of the panel meter (see step 4 in fig. 2–11). If the reading falls within the "LOAD" range, the r-f carrier is being properly fed to the antenna.

f. CHANGING OPERATING FREQUENCY.—During flight the operating frequency remains fixed at the spot frequency shown in the color-coded card on the front of the transmitter. Frequency changes on this equipment are to be made at a ground repair station. Complete directions for changing the frequency are given in the handbook of maintenance instructions for this equipment.

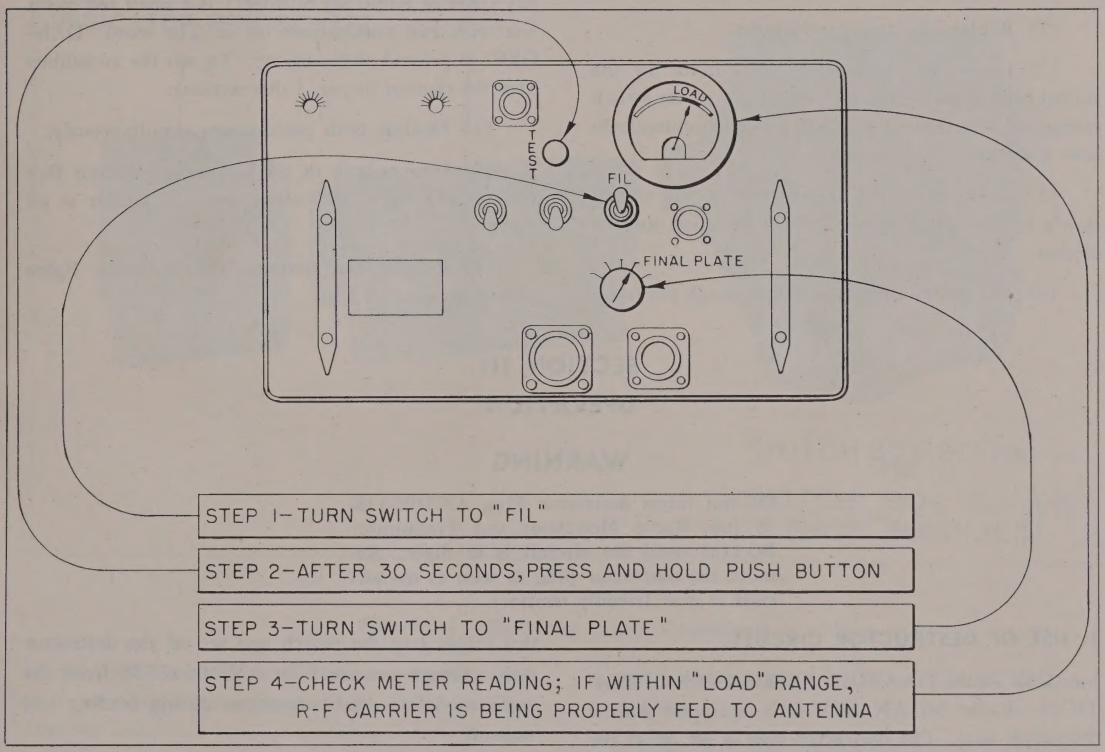

LOAD
TEST
FIL
FINAL PLATE
STEP 1–TURN SWITCH TO "FIL"
STEP 2–AFTER 30 SECONDS, PRESS AND HOLD PUSH BUTTON
STEP 3–TURN SWITCH TO "FINAL PLATE"
STEP 4–CHECK METER READING; IF WITHIN "LOAD" RANGE,
R-F CARRIER IS BEING PROPERLY FED TO ANTENNA

Figure 2–11. Procedure Used in Making Overall Check of Carrier

(1) Turn the "FIL-OFF" switch on the modulator and transmitter to the "FIL." position (see step 1 in fig. 2–11).

(2) Make sure the "CONTROLLED CARRIER-CONTINUOUS" switch is in the "CONTINUOUS" position.

(3) After 30 seconds, push the "TEST" push-button and turn the arrow switch to "FINAL PLATE" (see steps 2 and 3 in fig. 2–11).

3. CHECK OF DESTRUCTOR CIRCUIT.

CAUTION

Plug AN3106-12S-3S must be removed from Radio Modulator and Transmitter BC-1158 during all checks of the destructor circuit. Make sure that all destructor plugs on other equipments are also removed before making destructor circuit checks.

a. TO TRIP THE INERTIA SWITCH.—It is important that the destructor plug AN-3106-12S-3S from the modulator and transmitter unit be removed. Trip the inertia switch (Swich Box BC-706-A or SA-3/A, part of Radio Set SCR-695). To trip the mechanism of the inertia switch, unscrew the transparent cap and displace the pendulum arm until a sharp snap indicates that the switch is tripped (all contacts closed). The lamps on Indicator Box BC-727 should now light, indicating that the circuit is all right.

b. TO RESET THE INERTIA SWITCH.

(1) Replace the transparent cap.

(2) Insert the blade of a screwdriver in the slotted head screw on the right-hand side of the switch casing and turn it as far as it will go in a counterclockwise direction.

(3) Then allow the screwdriver to be turned slowly by the spring in a clockwise direction until it catches.

(4) The pendulum can be seen through the transparent cap to be approximately centered. The inertia switch is now reset.

(5) If one or both of the lights on Indicator Box BC-727 are still lighted, the inertia switch must again be reset as in (2) through (4) of par. 3 this section.

(6) Give the inertia switch a sharp blow on its side with the knuckles. If the indicator lights remain off, the inertia switch is now adjusted.

c. TO TEST THE SWITCHBOX.—Switchbox BC-765 (part of Radio Set SCR-695) is a small red metal box with two pushbuttons on it. The word "DANGER" is printed across its top. To test the switchbox (see the caution in par. 3 this section):

(1) Depress both pushbuttons simultaneously.

(2) One or both of the lights on Indicator Box BC-727 will light, indicating that the circuit is all right.

(3) Release the buttons; the indicator lights should go out.

SECTION III
OPERATION

WARNING

Do not insert destructor Plug AN3106-12S-3S into Radio Modulator and Transmitter BC-1158 until the aircraft is in flight. Remove the destructor plug as soon as the aircraft is over friendly territory.

1. USE OF DESTRUCTOR CIRCUIT.

a. CAUTION TO AVOID PREMATURE OPERATION.—Radio Set AN/ARW-9 is equipped with a destructor unit. The destructor unit is set off if the inertia switch receives a shock or sharp blow, or if the two buttons of Switchbox BC-765 or Switch SA-3/A (part of Radio Set SCR-695) are depressed simultaneously (see fig. 3–1). Care should be exercised to avoid premature operation of the destructor unit.

b. AUTOMATIC OPERATION OF DESTRUCTOR CIRCUIT.—Once set for operation, the inertia switch will be tripped by a shock of sufficient force in the horizontal plane of the aircraft, thereby closing the destructor circuit and setting off the destructor unit. Take care that the inertia switch is not accidentally struck or jarred during landing or take-off; this might trip the switch and set off the destructor unit. Always remove Plug AN3106-12S-3S from the radio modulator and transmitter during landing and take-off.

c. MANUAL OPERATION.—If it is necessary to destroy Radio Set AN/ARW-9, simultaneously depress both buttons of Switchbox BC-765 (see fig. 3–1) marked "DANGER."

2. STARTING AND STOPPING EQUIPMENT.

a. STARTING THE EQUIPMENT.—Turn the "FIL.-OFF" switch on the front panel of Radio Modulator and Transmitter BC-1158 to the "FIL." position or the filament toggle switch in the operator's compartment to the "ON" position, if used. Make sure the "CONTROLLED CARRIER-CONTINUOUS"

switch is in the "CONTINUOUS" position. (See fig. 1–2.) Allow at least 30 seconds for warm-up.

b. STOPPING THE EQUIPMENT.

(1) Turn the "FIL.-OFF" switch on the front panel of Radio Modulator and Transmitter BC-1158 to the "OFF" position or the filament toggle switch in the operator's compartment to the "OFF" position. (See fig. 1–2.)

(2) Make sure the destructor Plug AN3106-12S-3S has been removed from the destructor unit before the aircraft lands in friendly territory.

3. PROCEDURE FOR OPERATION.

a. Once the transmitter has been loaded and tuned in accordance with the directions in Sec. II, par. 2*c*, *d*, and *e*, all operation is carried on from the associated equipment.

b. Refer to Flight Instructions for the employment of Radio Set AN/ARW-9.

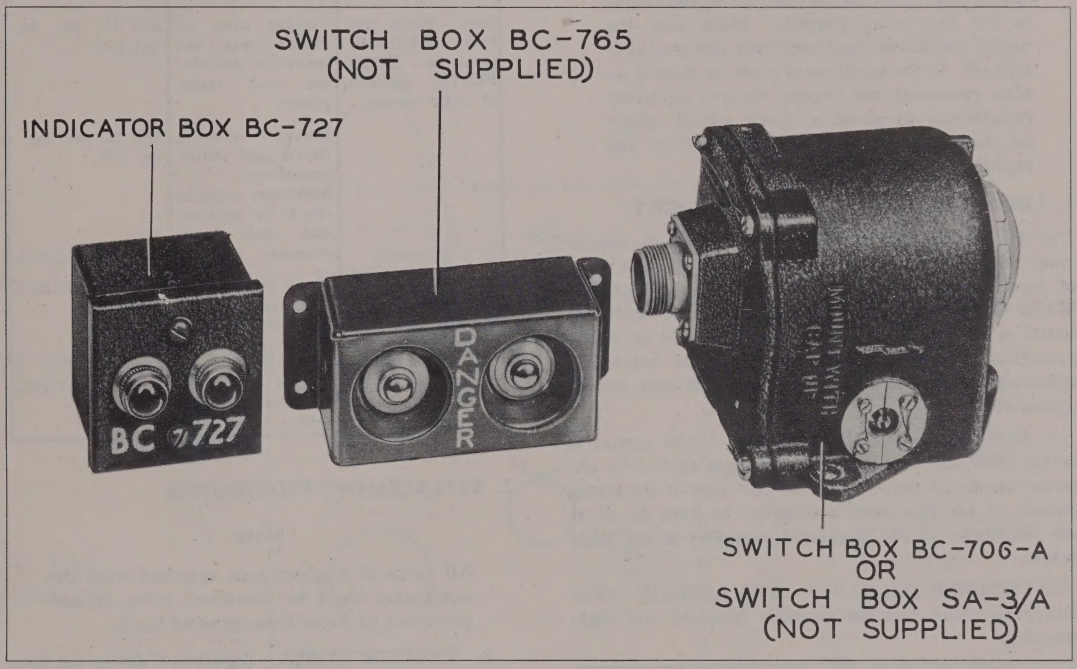


Figure 3–1. Destructor Circuit Components

SECTION IV
EMERGENCY OPERATION AND REPAIR

WARNING

Turn the "FIL-OFF" switch on the modulator and transmitter to the "OFF" position before removing the chassis of the modulator and transmitter from its cabinet to replace tubes or for any other purpose. Make sure the toggle switch on the associated equipment is also off. If the equipment must be turned on after removing the chassis, observe all safety regulations to avoid a shock which might be dangerous to life, or contact with the rapidly moving blades.

1. LOCATING TROUBLE DURING FLIGHT.

a. LISTENING TO DYNAMOTOR.—If the equipment does not respond properly, one of the best ways of localizing trouble is to listen to the dynamotor. When this is operating properly, a steady whirring sound is heard. If no sound at all is heard or if the operation sounds irregular, refer to the following trouble location chart for remedies which may restore operation.

b. CHECKING PANEL METER.—If the carrier is being produced properly an indication should be observed on the meter in all of the positions of the meter switch. If no indication is observed in some or all of the positions, try the suggested remedies in the table below.

c. TROUBLE LOCATION AND REMEDY.—The following chart lists the possible troubles and their remedies.

Trouble	*Remedy*	*References*
No operation of dynamotor	Replace fuses with spares.	Sec. IV, par. 2b; fig. 2–3.
	Tighten plugs on cable from dynamotor unit to primary power source.	
	Replace dynamotor low-voltage brushes with spares.	Sec. IV, par. 2c.
No indication on meter in some or all positions of meter switch, but dynamotor rotates.	Replace tubes with spares.	Sec. IV, pars. 2a (2); fig. 4–1.
	Tighten plugs on all cables.	
	Replace dynamotor high voltage brushes with spares.	Sec. IV, par. 2c.
	Replace fuses with spares.	Sec. IV, par. 2b, fig. 2–3.
	Replace crystal unit with spare.	
Meter reads outside "LOAD" range at "FINAL PLATE" position of meter switch.	Tighten plug on cable from antenna to modulator and transmitter.	Sec. IV, par. 2e; fig. 5–4.
	Retune antenna circuit and reload transmitter. Make any possible checks on antenna and cable from antenna.	Sec. II, par. 2c; fig. 2–9.
No remote control operation but meter reads within "LOAD" range in "FINAL PLATE" position in meter switch.	Check crystal color code against color code on card in holder on front panel; if different, replace crystal by one coded correctly.	Sec. IV, par. 2c; fig. 4–1.

2. REPLACEMENT PROCEDURES.

Note

All tubes of a given type supplied with the equipment shall be consumed prior to employment of tubes from general stock.

a. VACUUM TUBES.—Figure 4–1 shows the loca- of all tubes. The radio modulator and transmitter contain one tube JAN-815 and 10 tubes JAN-12SN7GT; the tuning unit contains three tubes JAN-815. If spares are provided for use during flight, replacement may be made after removing the chassis from its cabinet in accordance with the directions in figure 2–10. The "FIL-OFF" switch must be turned to "OFF" as well as the toggle-switch on the associated equipment before removing the chassis. Whenever it is necessary to test the equipment for proper operation with the chassis out of its cabinet, the equipment may be turned on after removal of the chassis, but care must be taken to avoid high-voltage shocks or contact with the fan blades.

(1) TUBES V-201 THROUGH V-206.—Figure 4–1 identifies these tubes. If any filaments are not lighted, replace the tube.

(2) TUBES V-211, V-301, V-302, AND V-303.—When the panel meter is used as described in section IV, paragraph 1b, it is possible to locate a defective type JAN-815 tube without replacing all of them.

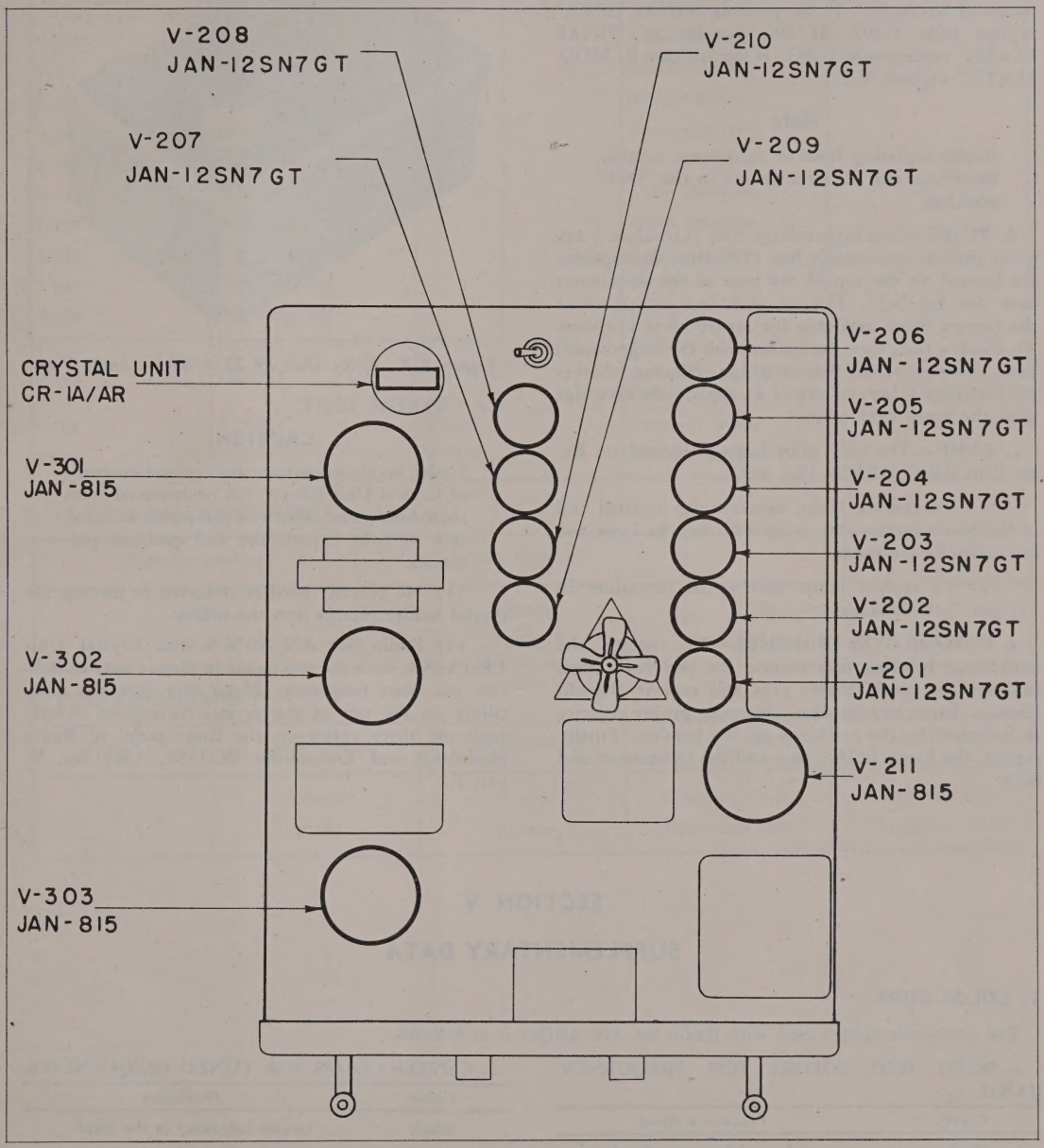


Figure 4–1. Radio Modulator and Transmitter BC-1158—Location of Tubes and Crystals

Rotate the meter switch clockwise, noting the first switch position at which the meter does not give an indication. If this point is "DOUB. GRID." or "TRIP. GRID," replace tube V-301, locating its position by means of figure 4–1. If the point is "FINAL GRID," replace tube V-302. If this position is "FINAL PLATE," replace tube V-303. If the position is "MOD. PLATE," replace V-211.

Note

Before replacing fuses or dynamotor brushes, be certain that all switches are in the "OFF" position.

b. FUSES.—One high-voltage fuse (Littelfuse 1 ampere) and one low-voltage fuse (Littelfuse 40 amperes) are located on the top of the base of the dynamotor unit (see fig. 2–3). Next to each fuse is a spare of the correct value available for replacement purposes. To check a fuse, turn the holder with the fingers until loose and remove the fuse cartridge. Observe whether the cartridge is burned out; if so, replace the cartridge with the spare next to it.

c. LAMP.—The only pilot lamp is located on Relay Unit RE-22/ARW-9 (fig. 4–2).

(1) To remove lamp, unscrew the knurled end of the lens assembly, the lamp will then be loose and can easily be removed.

(2) To replace lamp, reverse the procedure in (1) par. 2 this section.

d. DYNAMOTOR BRUSHES.—To replace the dynamotor brushes, first remove the end bells, then unscrew the brush holder caps and remove the old brushes. Insert new brushes, observing proper polarity as indicated by the markings on the brushes. Finally replace the brush holder caps and the dynamotor end bells.

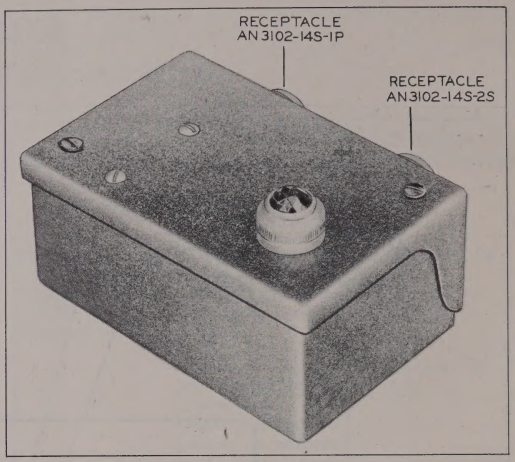


Figure 4–2. Relay Unit RE-22/ARW-9—Angle View

e. CRYSTAL UNIT.

CAUTION

Under no circumstances shall crystal elements of Crystal Unit CR-1A/AR be removed from their holders or otherwise tampered with except by fully experienced and qualified personnel.

(1) No polarity need be observed in placing the crystal holder prongs into the socket.

(2) Radio Set AN/ARW-9 uses Crystal Unit CR-1A/AR, with the top coded in three colors to indicate the exact frequency. Make sure that the three colors on the top of the crystal correspond exactly with the three colors on the front panel of Radio Modulator and Transmitter BC-1158. (See Sec. V, par. 1.)

SECTION V

SUPPLEMENTARY DATA

1. COLOR-CODE.

The color-code system used with Radio Set AN/ARQ-9 is as follows:

a. BOTH END COLORS FOR FREQUENCY BAND.

Color	*Frequency Band*
Black	Lowest frequency band
Brown	Second frequency band
Red	Third frequency band
Orange	Fourth frequency band
Yellow	Highest frequency band

b. CENTER COLOR FOR TUNED FREQUENCIES.

Color	*Frequency*
Black	Lowest frequency in the band
Brown	Second frequency in the band
Red	Third frequency in the band
Orange	Fourth frequency in the band
Yellow	Highest frequency in the band

2. TUBE COMPLEMENT.

Reference Symbol	*Type Designation JAN*	*Type Designation VT*	*Function*	*Location of Spares*
V-201	JAN-12SN7GT		Audio Oscillator	
V-202	JAN-12SN7GT		Audio Oscillator	
V-203	JAN-12SN7GT		Audio Oscillator	
V-204	JAN-12SN7GT		Audio Oscillator	
V-205	JAN-12SN7GT		Audio Oscillator	
V-206	JAN-12SN7GT		Audio Oscillator	
V-207	JAN-12SN7GT		Audio Amplifier	
V-208	JAN-12SN7GT		Audio Amplifier	
V-209	JAN-12SN7GT		Driver	
V-210	JAN-12SN7GT		Driver	
V-211	JAN-815	VT-287	Modulator	
V-301	JAN-815	VT-287	R-F Oscillator and Doubler	
V-202	JAN-815	VT-287	Push-pull tripler	
V-203	JAN-815	VT-287	Push-pull amplifier	

3. PILOT LAMP COMPLEMENT.

Type Designation	*Stock Number*	*Location*
LM-49	2Z5949	Indicator Box BC-727
LM-49	2Z5949	Relay Unit RE-22/ARW-9

4. FUSE COMPLEMENT.

Type No.	*Stock No.*	*Current Rating*	*Active Fuse*	*Spare Fuse*
	3Z1964	1 amp	Dynamotor Unit	Dynamotor Unit
	3Z1959	10 amp	Dynamotor Unit	Dynamotor Unit

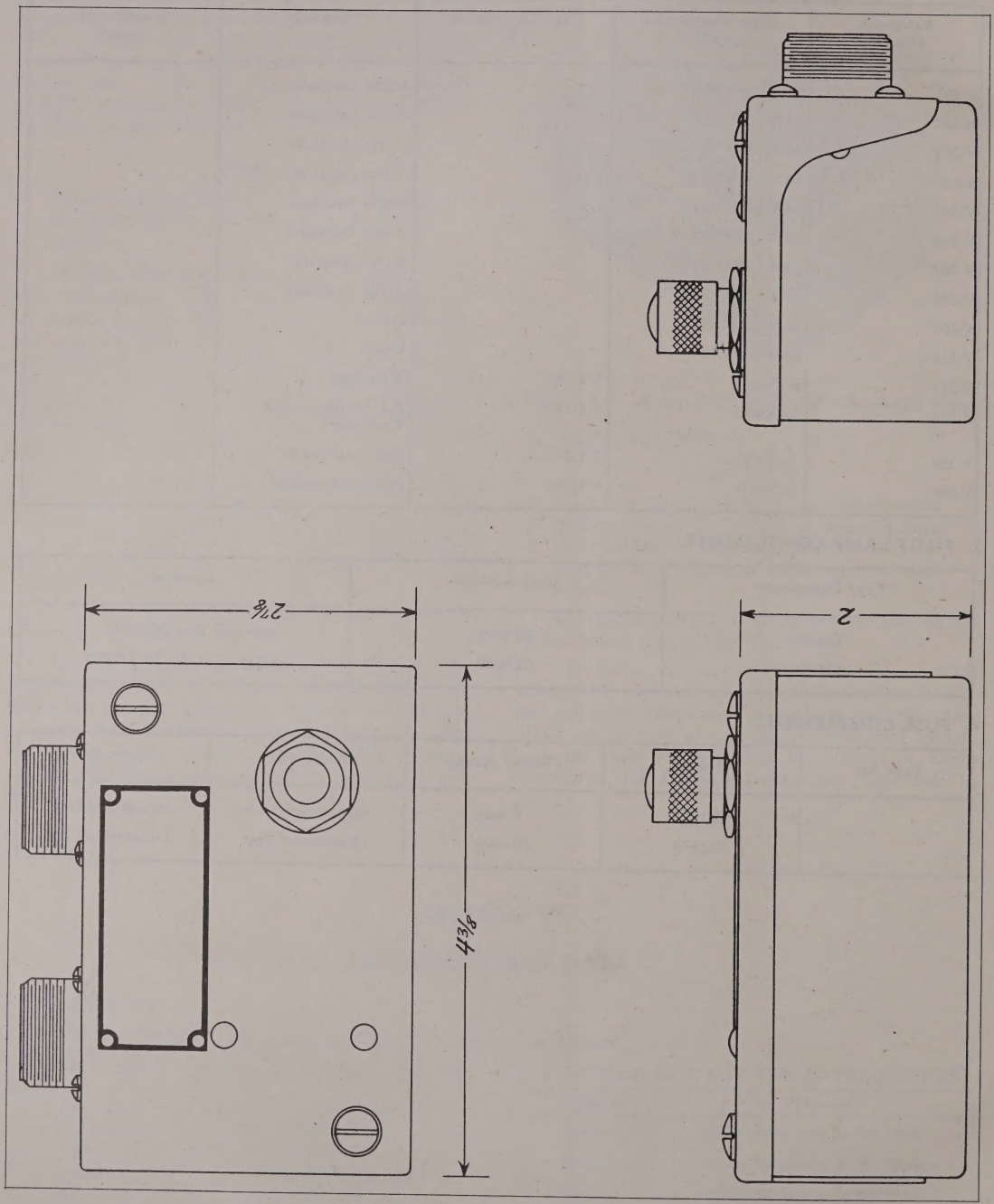
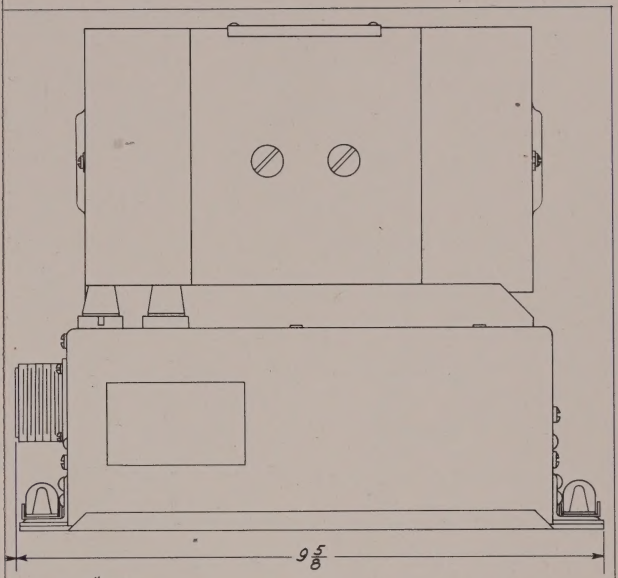


Figure 5–1. Relay Unit RE-22/ARW-9—Dimensional Diagram



ITEM	DESCRIPTION	TYPE NO.	WEIGHT	TOTAL WEIGHT
1	DYNAMOTOR UNIT	PE-186	18.3	18.8
2	MOUNTING	FT-497	.5	

tor Unit PE-186—Dimensional Diagram

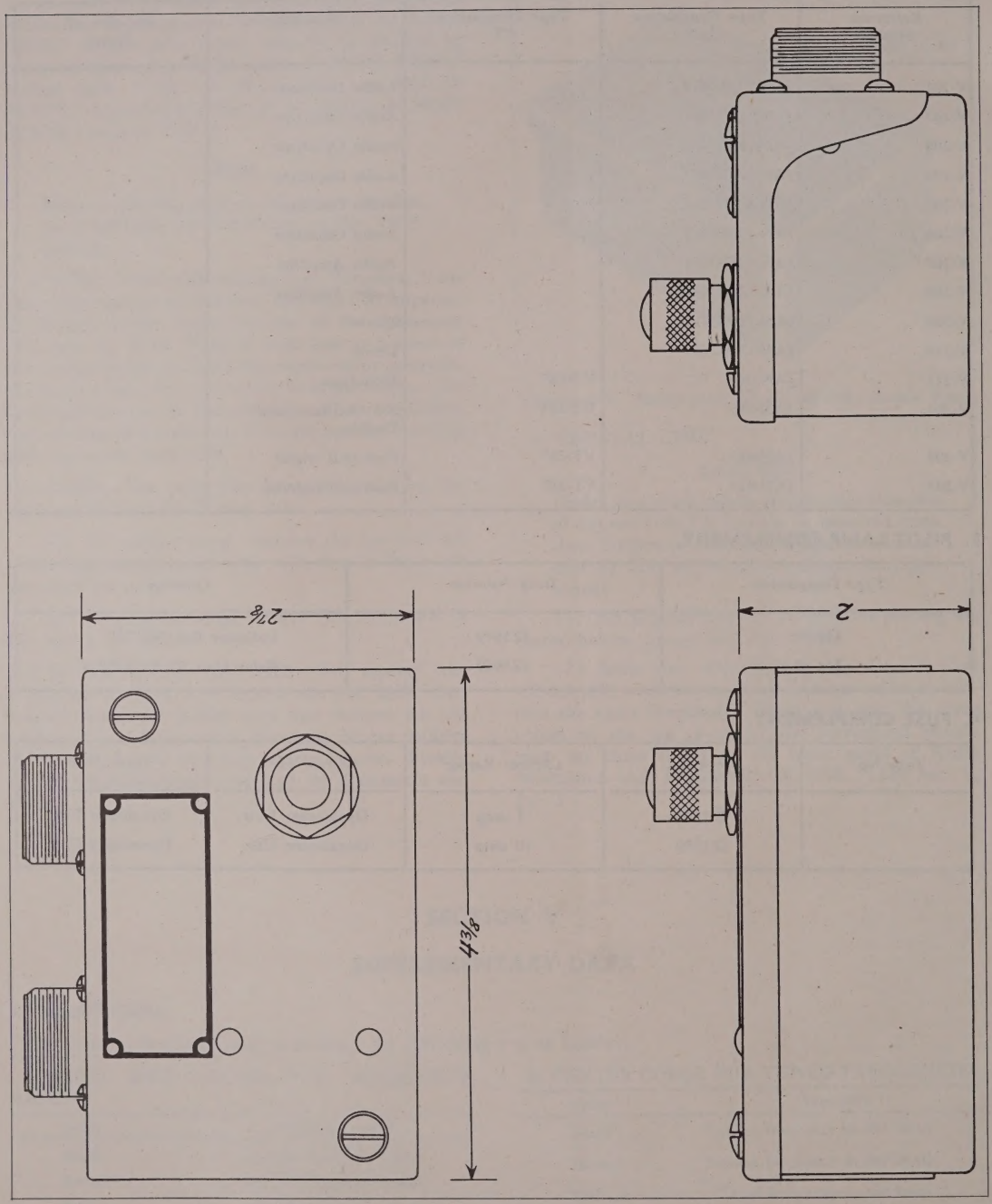
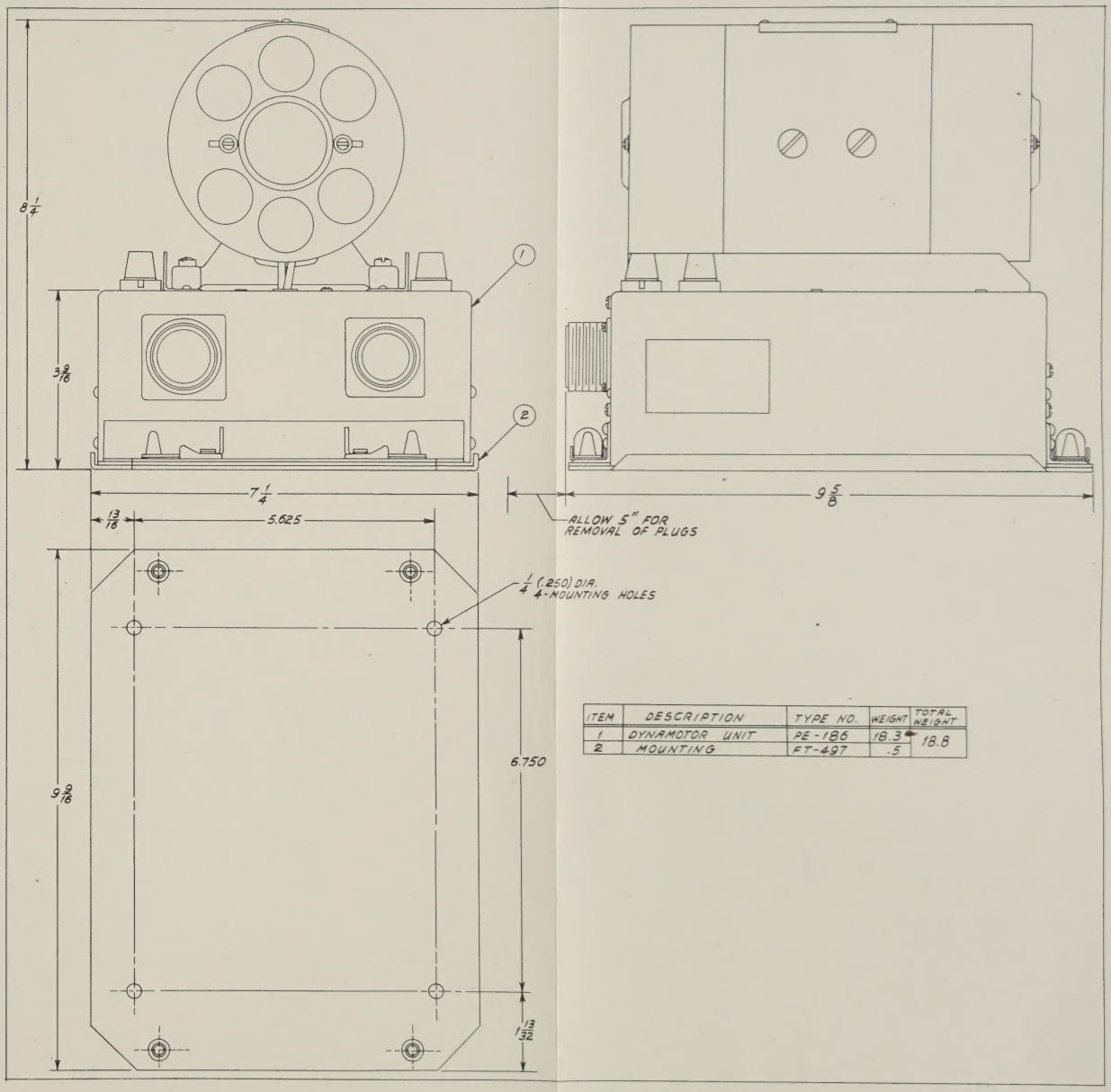
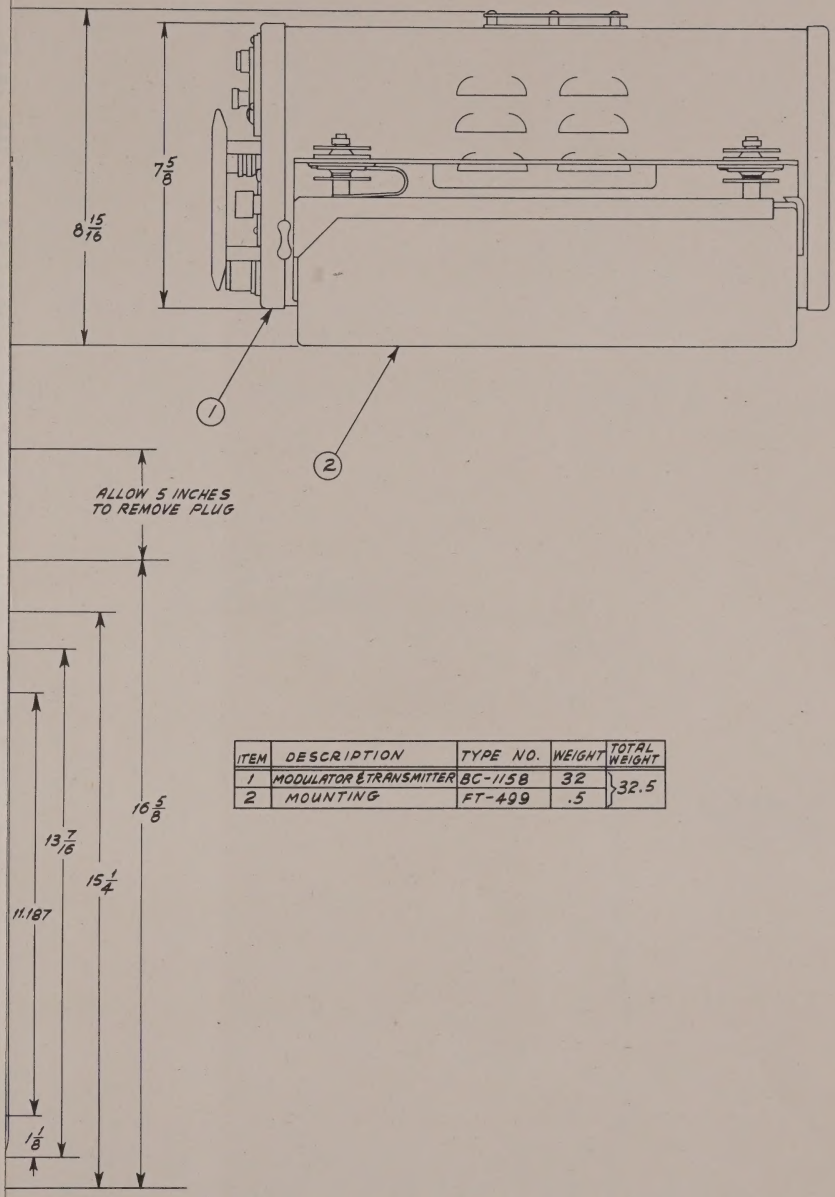


Figure 5–1. Relay Unit RE-22/ARW-9—Dimensional Diagram



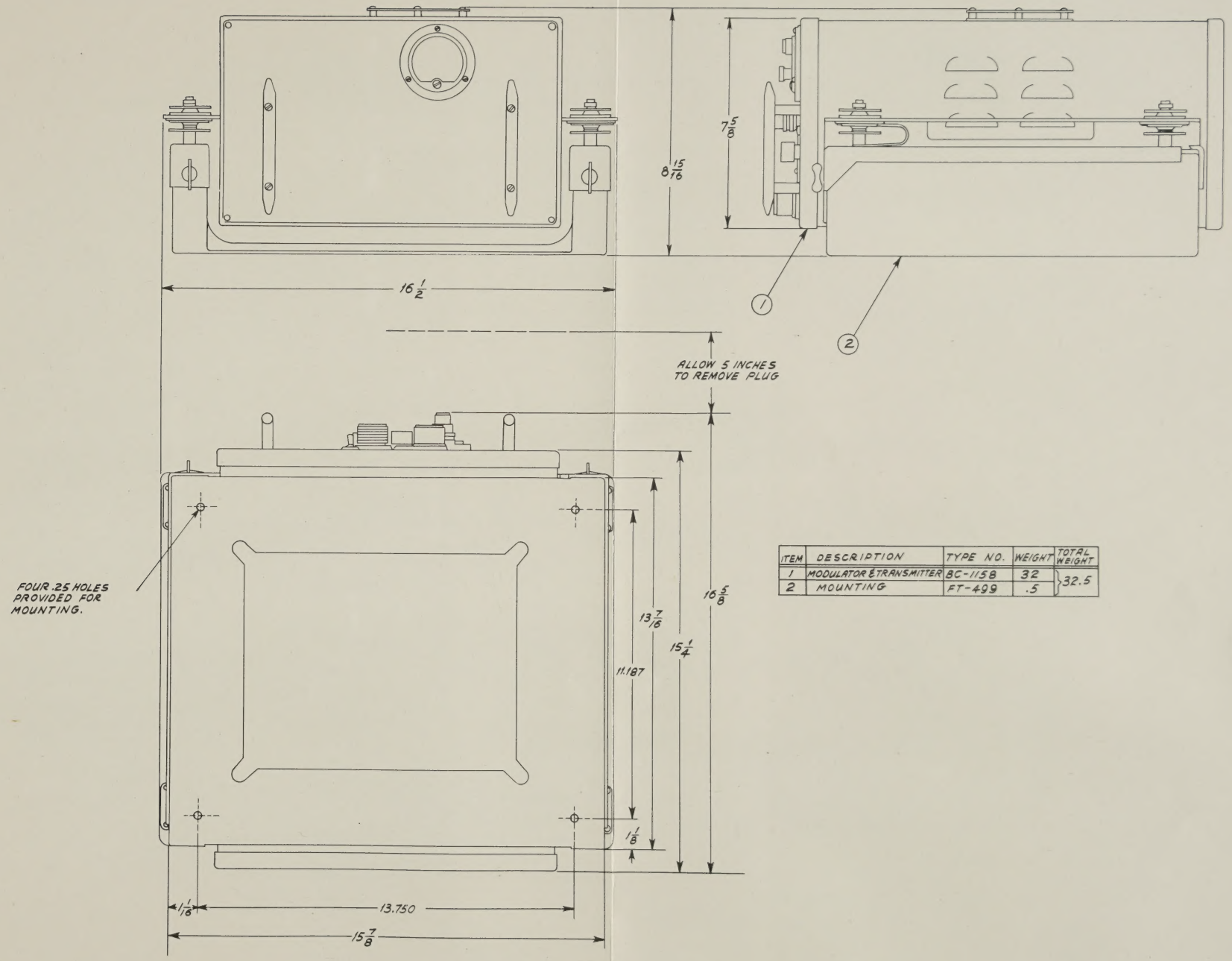
ITEM	DESCRIPTION	TYPE NO.	WEIGHT	TOTAL WEIGHT
1	DYNAMOTOR UNIT	PE-186	18.3	18.8
2	MOUNTING	FT-497	.5	

Figure 5–2. Dynamotor Unit PE-186—Dimensional Diagram



ITEM	DESCRIPTION	TYPE NO.	WEIGHT	TOTAL WEIGHT
1	MODULATOR & TRANSMITTER	BC-1158	32	32.5
2	MOUNTING	FT-499	.5	

5–3. *Radio Modulator and Transmitter BC-1158—Dimensional Diagram*



ITEM	DESCRIPTION	TYPE NO.	WEIGHT	TOTAL WEIGHT
1	MODULATOR & TRANSMITTER	BC-1158	32	32.5
2	MOUNTING	FT-499	.5	

Figure 5–3. Radio Modulator and Transmitter BC-1158—Dimensional Diagram

IRE TABLE		
AFT CABLE PER SPEC. AN-J-C-48.		
XIMUM RATING LTAGE	MAX. ALLOWANCE RESISTANCE IN OHMS (70° C)	MINIMUM CABLE SIZE PERMITTED
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN8
		AN8
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20
		AN20

COMPONENT TABLE

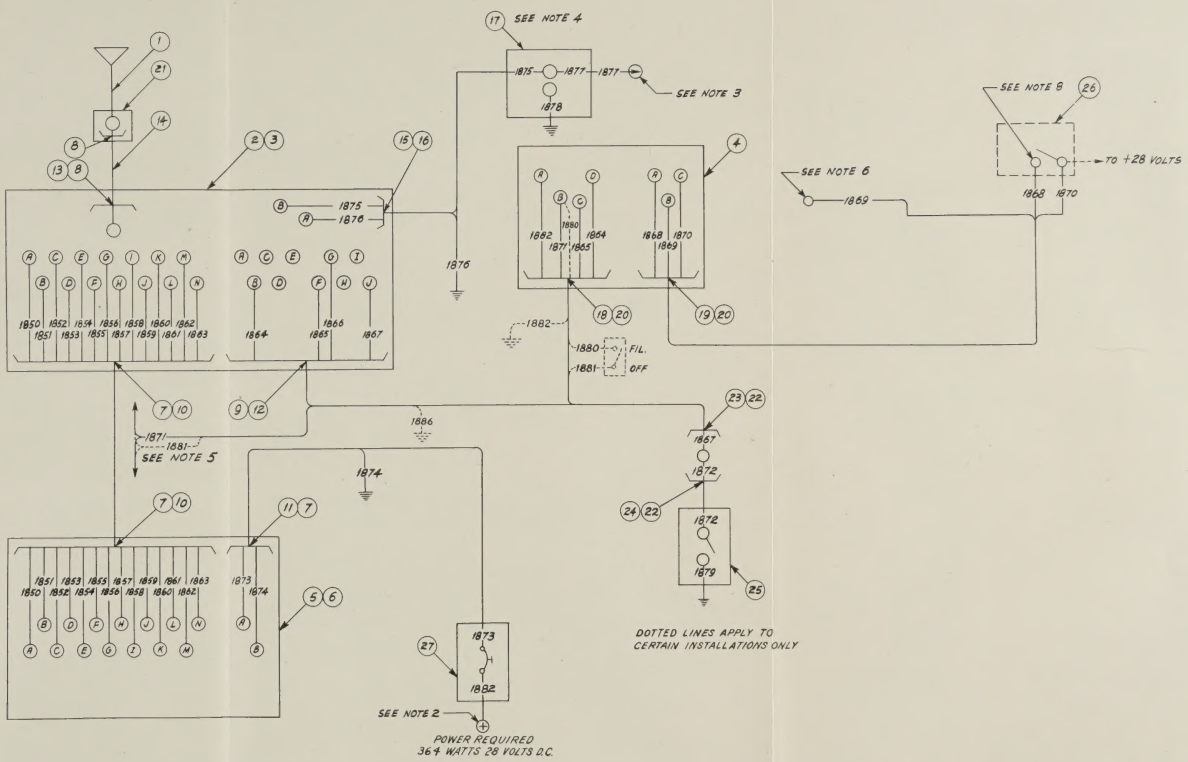
ITEM	QUAN. REQ'D	EQUIPMENT NOMENCLATURE DESCRIPTION	EQUIPMENT NOMENCLATURE TYPE No.	SPECIFICATION OR INSTALLATION DRAWING
* 1	1	Antenna	AS-97/ART	
		Antenna —or—	AS-150/ART	
		Antenna —or—	AS-161/ART	
* 2	1	Radio Mod. & Transmitter	BC-1158 or BC-1158-A	H44G26613
* 3	1	Mounting	FT-499	H44G26613
* 4	1	Relay Unit	RE-22/ARW-9	
* 5	1	Dynamotor Unit	PE-186 or PE-186-A	H44G26612
* 6	1	Mounting	FT-497	H44G26612
* 7	3	Adapter	AN3057-12	AN3057
* 8	2	Plug	PL-259	H43G11747
* 9	1	Plug	AN3106-18-1S	AN-W-C-591
*10	2	Plug	AN3106-20-1S	AN-W-C-591
*11	1	Plug	AN3106-22-1S	AN-W-C-591
*12	1	Adapter	AN3057-10	AN-3057
*13	2	Adapter	M-359	H43G11747
*14	As Req'd	Cable	WC-549-( ), RG-31/U or RG-8/U	
*15	1	Plug	AN3106-12S-3S	AN-W-C-591
*16	1	Adapter	AN3057-4	AN3057
*17	1	Indicator Box	BC-727	H42B10635
*18	1	Plug	AN3106-14S-2S	
*19	1	Plug	AN3106-14S-1S	
*20	2	Adapter	AN3057-6	AN3057
*21	1	Antenna Base	AB-29/ART	H44D26629
*22	2	Adapter	AN-3057-3	AN-3057
*23	1	Receptacle	AN3100-8S-1P	
*24	1	Plug	AN3106-8S-1S	
*25	1	Switch	(See Note 7)	
26	1	Toggle Switch		
27	1	Circuit Breaker	AN3161-P35	
28	1	Switch	AN3022-2	AN3022

* Indicates Government-furnished equipment.

Figure 5–4. Radio Set AN/ARW-9—Cording Diagram

NOTES

1. All terminal strips required in the installation of the wiring shall be made of suitable insulating material and with terminal spacing to provide against voltage breakdown.
2. Connect to d-c power supply.
3. Connect to terminal of Switch Box SA-3/A where wire #827 of Radio Set SCR-695 makes connection; or connect to terminal of Switch Box BC-765 where wire #828 of SCR-695 connects; or connect to terminal of Indicator Box where wire #828 of SCR-695 connects. (See Dwg. H44G3190.)
4. RADIO SET AN/ARW-9 does not require a separate Indicator Box (17) in cases where the equipment is mounted so that the Indicator Box for Radio Set SCR-695 may be used. In such cases SCR-695 Indicator Box must be clearly visible when connecting the detonator plugs to this equipment.
5. Connect wire #1871 to pin "J" and #1880 to pin "B" of either plug item ⑱.
6. Connect wire #1869 to pin "A" of Parent Equipment plug AN3106-145-7S or pin 1 of plug GK-M5-21-9⅛-AC, depending on type of Parent Equipment installed in the aircraft.
7. General Electric type CR1070C103-B3, or equal.
8. When AN/ARW-9 equipment is installed disconnect from switch ⑲ and tape up the wire from pin "A" of Parent Equipment plug AN3106-145-7S or pin 1 of plug GK-M5-21-9⅛AC (depending on type of Parent Equipment installed in airplane) and connect wire #1868 to the vacated terminal.
9. Reference items are required only when equipment is installed in airplanes with pressurized cabins where item ⑮ is located outside the pressurized cabin. Reference items are provided with associated equipment AN/ARW-10 (see Dwg. H45D2457.)



WIRE TABLE

ALL WIRE TO BE AIRCRAFT CABLE PER SPEC. AN-J-C-48.

REF. NOTE	WIRE NOTE	MAXIMUM OPERATING VOLTAGE	MAX. ALLOWANCE RESISTANCE IN OHMS (70° C)	MINIMUM CABLE SIZE PERMITTED
	1850			AN20
	1851			AN20
	1852			AN20
	1853			AN20
	1854			AN20
	1855			AN20
	1856			AN20
	1857			AN20
	1858			AN20
	1859			AN20
	1860			AN20
	1861			AN20
	1862			AN20
	1863			AN20
	1864			AN20
	1865			AN20
	1866			AN20
	1867			AN20
	1868			AN20
	1869			AN20
	1870			AN20
	1871			AN20
	1872			AN20
	1873			AN8
	1874			AN8
	1875			AN20
	1876			AN20
	1877			AN20
	1878			AN20
	1879			AN20
	1880			AN20
	1881			AN20

COMPONENT TABLE

ITEM	QUAN. REQ'D	EQUIPMENT NOMENCLATURE DESCRIPTION	EQUIPMENT NOMENCLATURE TYPE No.	SPECIFICATION OR INSTALLATION DRAWING
* 1	1	Antenna	AS-97/ART	
		Antenna or	AS-150/ART	
		Antenna or	AS-161/ART	
* 2	1	Radio Mod. & Transmitter	BC-1158 or BC-1158-A	H44G26613
* 3	1	Mounting	FT-499	H44G26613
* 4	1	Relay Unit	BE-22/ARW-9	
* 5	1	Dynamotor Unit	PE-186 or PE-186-A	H44G26612
* 6	1	Mounting	FT-497	H44G26612
* 7	3	Adapter	AN3057-12	AN3057
* 8	2	Plug	PL-259	H43G11747
* 9	1	Plug	AN3106-18-1S	AN-W-C-591
*10	2	Plug	AN3106-20-1S	AN-W-C-591
*11	1	Plug	AN3106-22-1S	AN-W-C-591
*12	1	Adapter	AN3057-10	AN-3057
*13	2	Adapter	M-359	H43G11749
*14	As Req'd	Cable	WC-549-( ); RG-31/U or RG-8/U	
*15	1	Plug	AN3106-12S-3S	AN-W-C-591
*16	1	Adapter	AN3057-4	AN3057
*17	1	Indicator Box	BC-727	H43B10635
*18	1	Plug	AN3106-14S-2S	
*19	1	Plug	AN3106-14S-1S	
*20	2	Adapter	AN3057-6	AN3057
*21	1	Antenna Base	AB-29/ART	H44D20629
*22	2	Adapter	AN-3057-3	AN-3057
*23	1	Receptacle	AN3100-8S-1P	
*24	1	Plug	AN3106-8S-1S	
*25	1	Switch	(See Note 7)	
26	1	Toggle Switch		
27	1	Circuit Breaker	AN3161-P3S	
28	1	Switch	AN3022-2	AN3022

* Indicates Government-furnished equipment.

Figure 5-4. Radio Set AN/ARW-9—Cording Diagram